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DIGITAL CHINA: POWERING THE ECONOMY TO GLOBAL COMPETITIVENESS

DECEMBER 2017

EXECUTIVE SUMMARY

MCKINSEY GLOBAL INSTITUTE

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DECEMBER 2017

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IN BRIEF

DIGITAL CHINA

China is already a major player in digital technologies at home and around the world, and it has enormous growth potential. As digital forces shake the status quo and restructure value chains, an even more globally competitive Chinese economy and dynamic firms can emerge.

- China has become a leading global force in the digital economy. The country has 42 percent of global e-commerce, processes 11 times more mobile payments than the United States, and is home to one-third of the world's unicorns.
- Three factors suggest huge upside for China: a large and young Chinese market enabling rapid commercialization of digital business models; a rich digital ecosystem expanding beyond a few giants; and the government allowing space for digital companies to experiment, and being an investor in and consumer of digital technologies.
- The new MGI Industry Digitization Index for China reveals that a large gap vs. counterpart sectors in the United States has been closing rapidly. In 2013, the United States was 4.9 times more digitized than China; in 2016, that figure was 3.7 times.
- Three digital forces—disintermediation, disaggregation, and dematerialization—can potentially shift (and create) 10 to 45 percent of industry revenue pools by 2030. Disintermediation and disaggregation can have the largest impact.
  - **Consumer and retail.** Disintermediation (omnichannel, data-driven business models) is a major force for meeting evolving consumer demand. Disaggregation (sharing economy) and dematerialization (3-D–printed goods) can serve niche demand in specific categories. These forces can impact 13 to 34 percent of the industry revenue pool.
  - **Automotive and mobility.** Disintermediation (omnichannel, connected cars) enables technology suppliers and automakers to reach consumers directly, and disaggregation (shared-mobility solutions) may reduce demand for new car sales. Overall, digital forces can have an impact on 10 to 30 percent of the industry revenue pool.
  - **Health care.** Disintermediation (Internet of Things–and artificial intelligence–enabled solutions) can help to address chronic diseases, while disaggregation (health-care big data) can minimize overtreatment. There could be an impact equivalent to 12 to 45 percent of health-care expenditure.
  - **Freight and logistics.** Disintermediation (real-time matching platforms) can address industry fragmentation while disaggregation (crowdsourcing delivery) can enable flexible capacity. These forces could impact 23 to 33 percent of the revenue pool.
- China's government can enable digitization by continuing to be a major investor in, and consumer of, digital technologies, promoting healthy competition, managing labor markets as the economy transitions to digital, and contributing to the effort to reach consensus in the global debate on issues such as technology standards and digital sovereignty.
- Companies in China need to embrace digital even more than elsewhere because China's rapidly growing and changing economy will magnify gains for winners and risks for losers. They may consider six approaches: adopt bold strategies; use the power of China's vast ecosystem; maximize value from analytics by using China's massive data pools; build an agile organization; digitize operations; and engage with China's policy and regulation.

Digital China

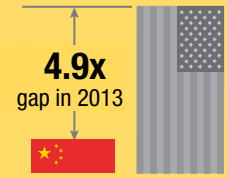
CHINA IS ALREADY A GLOBAL FORCE IN DIGITAL TECHNOLOGIES

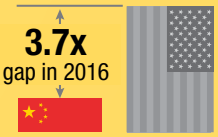
42%
share of global e-commerce transactions

34%
of global unicorns[1]

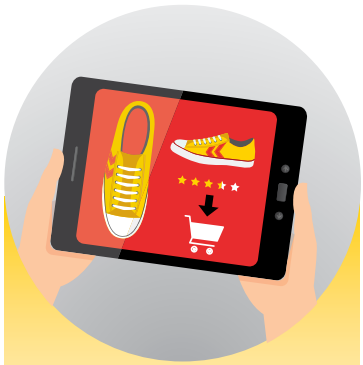
Top three
in the world for venture capital investment in emerging technologies[2]

IT LAGS BEHIND THE UNITED STATES ON THE DIGITIZATION OF ITS INDUSTRY, BUT IS CATCHING UP QUICKLY



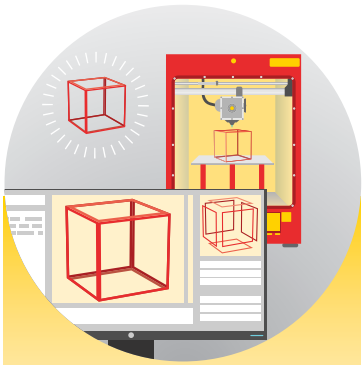


THREE DIGITAL FORCES CAN SHIFT (OR CREATE) 10–45% OF INDUSTRY REVENUE POOLS BY 2030



DISINTERMEDIATION
Using digital to cut out the middle man

DISAGGREGATION
Breaking up large items (cars, properties) and repackaging as services

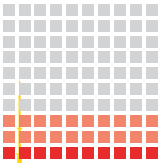


DEMATERIALIZATION
Turning the physical into the virtual (3-D printing, virtual reality)

THE POTENTIAL IMPACT OF THE THREE FORCES IN FOUR KEY SECTORS IS LARGE

CONSUMER AND RETAIL
13–34%

AUTOMOTIVE AND MOBILITY
10–30%



HEALTH CARE
12–45%

FREIGHT AND LOGISTICS
23–33%

GOVERNMENT CAN:
- Be a major investor in, and consumer of, digital technologies
- Promote healthy and dynamic competition
- Manage labor markets transition during digital disruption
- Reach global consensus on digital governance

BUSINESS PRIORITIES INCLUDE:
- Adopt bold strategies
- Use China's digital ecosystem
- Maximize value from China's massive data pool
- Build an agile organization
- Digitize operations
- Engage with policy and regulation

1 Defined as a privately held startup valued at over $1 billion.
2 Top three investor in technologies including big data, artificial intelligence and machine learning, wearables, virtual reality, autonomous vehicles, 3-D printing, robotics, and drones.

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EXECUTIVE SUMMARY

China has become a force to be reckoned with in digital at home and around the world. As a major worldwide investor in digital technologies and one of the world's leading adopters of the technologies, it is already shaping the global digital landscape and supporting and inspiring entrepreneurship far beyond its own borders.

But there is much more to come. As China digitizes, industries will experience huge shifts in revenue and profit pools across the value chain. This creative destruction is happening globally as the world digitizes, but it is likely to happen more quickly and be on a relatively larger scale in China given a combination of inefficiencies in traditional sectors and massive potential for commercialization.

In this report, the McKinsey Global Institute (MGI) assesses the strengths of China's digital system and the degree of digitization of industries. In order to understand how digitization is shaking the status quo and creating winners and losers, MGI looks at how three digital forces—disintermediation, disaggregation, and dematerialization—can restructure value chains and increase the magnitude of disruption. The research explores how policy makers can facilitate the transition toward a digital economy and what choices companies can make to prepare for the impending wave of change.

CHINA IS HOME TO DYNAMIC DIGITAL INNOVATORS AND IS A LEADING GLOBAL INVESTOR IN THE LATEST TECHNOLOGIES

China accounts for
>40%
of global
e-commerce

Conventional measures of digitization in China suggest that the nation is only in the middle of the pack. However, our view is that digital China is already more advanced than these measures suggest, and its potential is far larger than most observers realize.[1]

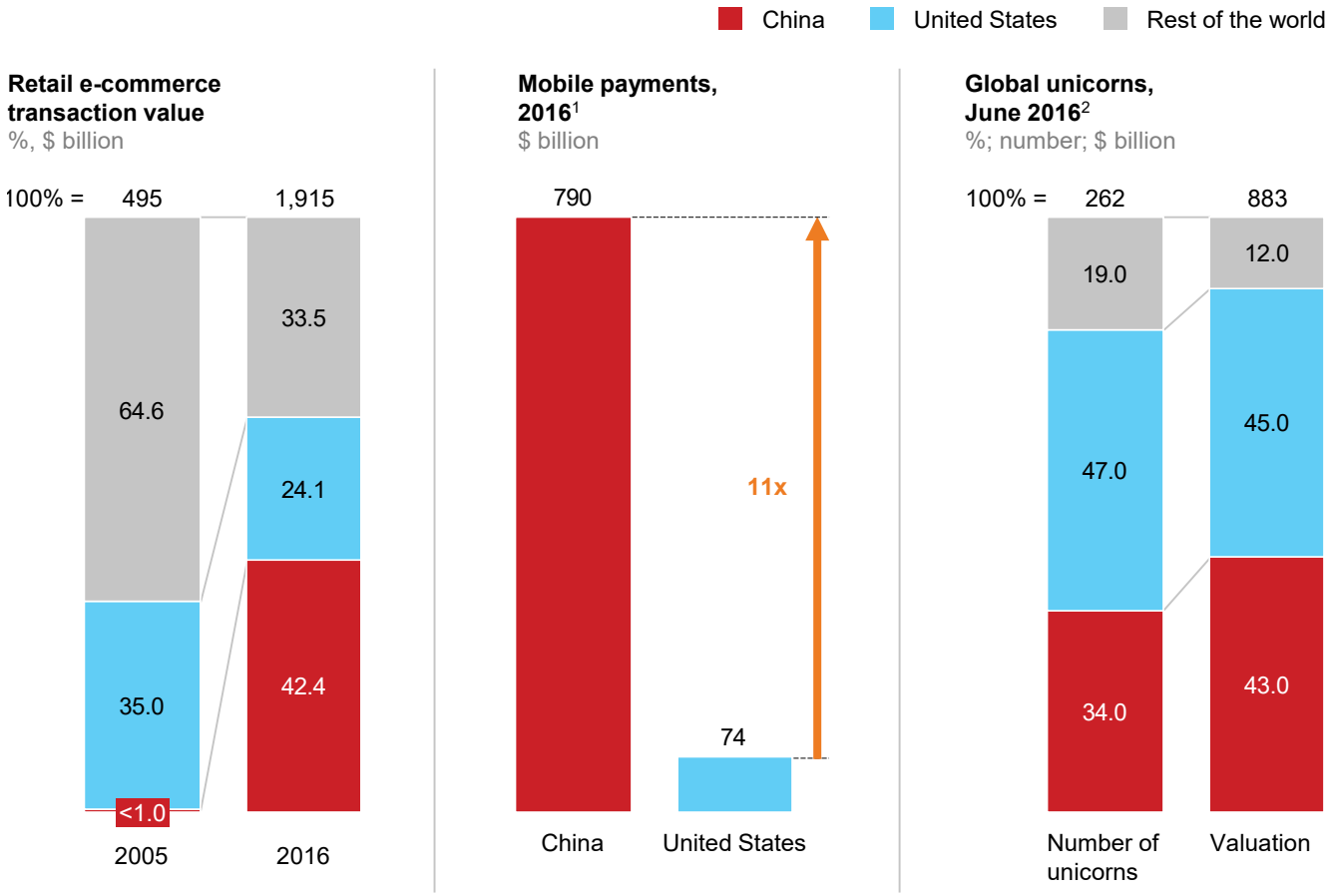
In e-commerce, China accounted for less than 1 percent of the value of worldwide transactions only about a decade ago; that share is now more than 40 percent. The current value of China's e-commerce transactions is estimated to be larger than in France, Germany, Japan, the United Kingdom, and the United States combined. Penetration of mobile payments among China's internet users grew from just 25 percent in 2013 to 68 percent in 2016. In 2016, the value of mobile payments related to individuals' consumption was $790 billion, 11 times that of the United States. One in three of the world's 262 unicorns is Chinese, commanding 43 percent of the global value of these companies (Exhibit E1).

China's venture capital industry is increasingly focused on digital. Overall, China's venture capital sector has grown rapidly, from just $12 billion, or 6 percent of the global total, in 2011–13 to $77 billion, or 19 percent of the worldwide total, in 2014–16. The majority of venture capital investment is in digital technologies such as big data, artificial intelligence (AI), and financial technology (fintech) companies. China is in the top three in the world for venture capital investment in key types of digital technology including virtual reality (VR), autonomous vehicles, 3-D printing, robotics, drones, and AI.

[1] China ranked 50th out of 131 countries on the 2016 Digital Adoption Index published by the World Bank, and 59th out of 139 on the World Economic Forum's Networked Readiness Index. The Digital Adoption Index is based on general digital business adoption, internet and mobile access for citizens, and online public services. The Networked Readiness Index is based on the macroeconomic environment, digital readiness and infrastructure, digital usage, and the economic and social impact of the network. These rankings tend to use national averages, and therefore do not fully capture powerful industry dynamics and consumer behaviors.

Exhibit E1

China's digital economy is a story of commercial success and investor excitement



1 Refers to third-party payments conducted through mobile transactions. For China, mobile payments exclude bank or UnionPay credit card transactions, digital wealth management, and digital finance. For the United States, payments are in-person payments on mobile between buyers and sellers, and remote payments on mobile devices.
2 Defined as a privately held startup valued at over $1 billion.
NOTE: Numbers may not sum due to rounding.

SOURCE: PitchBook; Dealogic; eMarketer; iResearch; TechCrunch CrunchBase Unicorn Leaderboard; McKinsey Global Institute analysis

Three factors suggest that there is huge upside for digital in China.

- **The big and young Chinese market is enabling rapid commercialization of digital business models on a large scale.** In 2016, China had 731 million internet users, more than the European Union (EU) and the United States combined; and 695 million mobile users (95 percent of total internet users), compared with 343 million in the EU (79 percent), and 262 million in the United States (91 percent). Nearly one in five internet users in China relies on mobile only, compared with just 5 percent in the United States. China's mobile share of e-commerce sales is around 70 percent vs. 30 percent in the United States; its share of internet users making mobile digital payments is around 68 percent vs. 15 percent in the United States.

- **Three of China's internet giants—Baidu, Alibaba, and Tencent, or BAT—are building a rich digital ecosystem that is now growing beyond them.** The BAT companies have built strong market positions by taking out inefficient, fragmented, and low-quality offline markets. These companies started with an anchor offering and then diversified. Players like Alibaba's Alipay and Tencent's WeChat now offer "superapps," which give consumers a one-stop shop covering education, health, information services, entertainment, e-commerce, and social interactions. The big three have been powerful

enablers, providing 42 percent of Chinese venture capital investment in 2016. One in five top Chinese startups was founded by BAT or BAT alumni, and an additional 30 percent receive funding from BAT firms. Large incumbents such as Ping An and Huawei are also building their own ecosystems that go beyond their traditional industries.

- **The government gave digital players space to experiment before enacting official regulation, and it is becoming an active supporter.** The Chinese government moved to regulate the digital sector only after a delay. While consumer protection may sometimes have been weak, this approach gave innovators space to experiment. For example, regulators took 11 years after Alipay introduced online money transfers in 2005 to set a cap on the value of such transfers. Today, the government is actively building world-class infrastructure to support digitization as an investor, developer, and consumer.

With these factors, the impact of digital China on the global economy has been increasing. China ran an annual surplus in digital services of $10 billion to $15 billion over the past five years. Its outbound venture capital totaled $38 billion in 2014–16, or 14 percent of global venture capital investment outside China, up from $6 billion, or 4 percent, in 2011–13. Over the past two years, China's top three internet companies made 35 overseas deals, compared with 20 by the top three US internet companies. China is also exporting digitally driven business models and enabling foreign partners.

CHINESE INDUSTRIES LAG BEHIND THEIR COUNTERPARTS IN ADVANCED ECONOMIES ON DIGITIZATION, BUT THE GAP IS RAPIDLY CLOSING

US industries were **3.7x** more digitized than those in China in 2016, vs. **4.9x** in 2013

China is already a global leader in the consumer-driven digital economy. The next wave of digital transformation in China is likely to come from broader adoption of digital technologies by businesses in different sectors that will restructure value chains and boost productivity.[2] The new MGI Industry Digitization Index for China assesses where its sectors stand on digitization relative to each other and reveals that Chinese industries are at very different stages (Exhibit E2).[3]

Overall, digitization of industries in China still lags behind that of the United States by a considerable margin, but that gap is narrowing rapidly. In 2013, the United States was 4.9 times more digitized than China; in 2016, that figure had fallen to 3.7 times.

The index reveals five clusters of sectors that are at similar stages of their digitization. As in other economies, the most digitized sectors in China include information and communications technologies (ICT), media, and finance (Cluster 1). In ICT, China's internet companies are rapidly ramping up investment in digital infrastructure. To give an idea of the size of this investment, demand for servers from China's tech giants is as large as the entire national demand of countries such as Brazil and South Korea. Chinese semiconductor companies have been automating and digitizing facilities to serve global customers. Another pattern that is similar to those in other economies is that the sectors that lag furthest behind are fragmented and localized industries such as real estate, agriculture, local services, and construction (Cluster 5). However, even in lagging sectors, digital solutions are penetrating. In real estate, for instance, digital companies such as Anjuke.com and Fang.com offer real-time house listings for sale and rent. Residential-property company Vanke's mobile app offers services including property maintenance. Small and fragmented local services

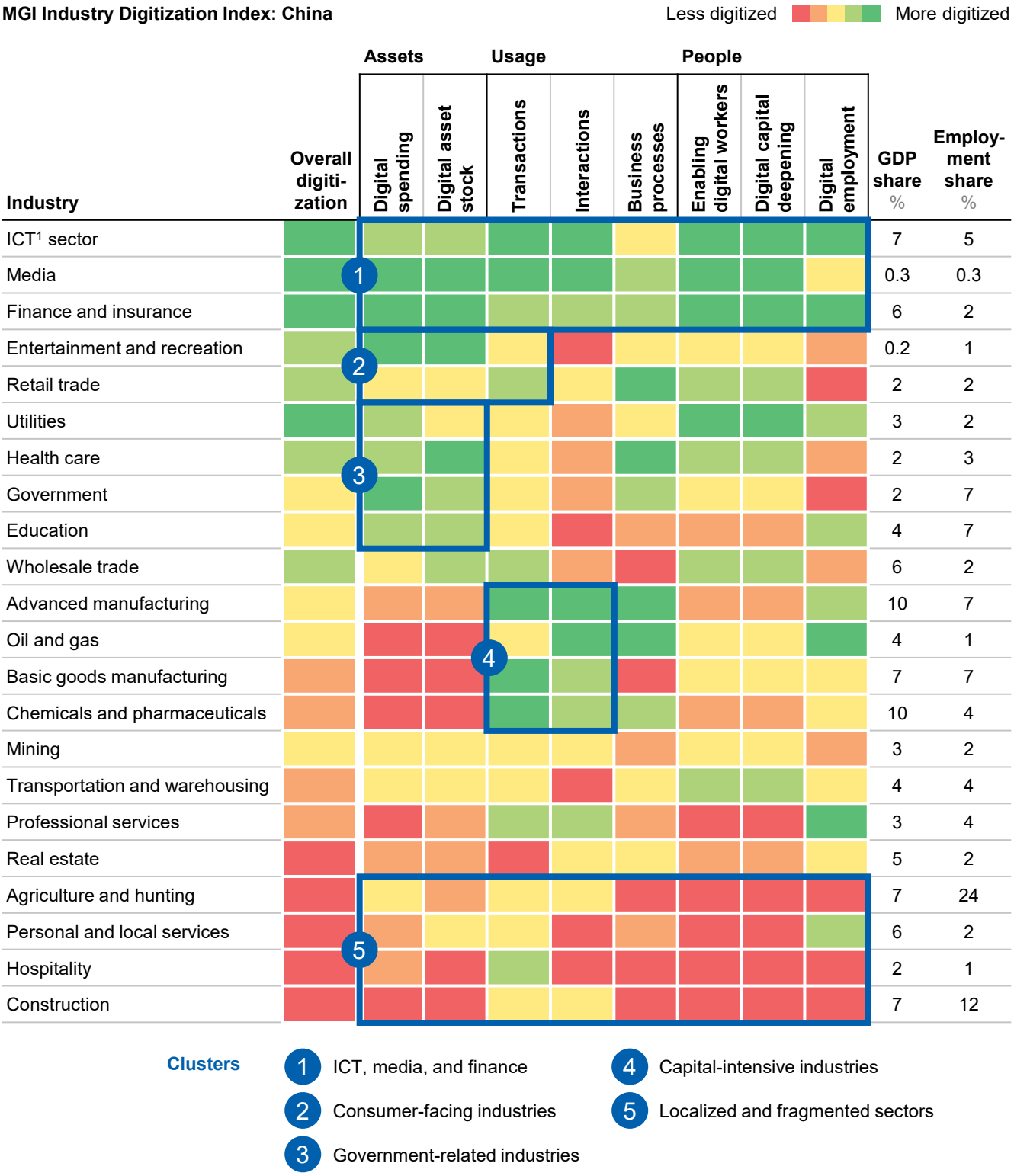
[2] *China's digital transformation: The internet's impact on productivity and growth*, McKinsey Global Institute, July 2014.

[3] We analyzed 22 industries on 25 indicators, and used this analysis to calculate the index on three dimensions: assets, their use, and labor. To quantify where different Chinese sectors stand on digitization, we used MGI's methodology in previous research on digitization in the United States and Europe. See *Digital America: A tale of the haves and have-mores*, McKinsey Global Institute, December 2015; and *Digital Europe: Pushing the frontier, capturing the benefits*, McKinsey Global Institute, June 2016.

companies such as restaurants and household-management businesses are benefiting by participating in digital platforms even if they don't invest heavily in digital assets themselves.

Exhibit E2

MGI Industry Digitization Index: China



1 Information and communications technology.

SOURCE: Gartner; Kable; OECD; Central Bureau of Statistics; Bloomberg; McKinsey Global Institute analysis

2-3x
higher growth in profit margins in the most digitized sectors vs. the least digitized

China's consumer-facing industries (Cluster 2) and sectors associated with government (Cluster 3) rank higher relative to other sectors compared with their counterparts in the United States and Europe. Chinese consumers are enthusiastically embracing digital technologies, and the industries that serve them have had to respond by investing in digital assets and processes. In entertainment, more than half of event tickets were sold through digital channels in 2016 (75 percent in the case of movies), according to iResearch estimates. In retail, about 45 percent of retailers had developed online sales channels by 2016, up from just 25 percent in 2014, according to the China Internet Network Information Center. There has been massive investment in government-associated sectors, too. In utilities, China was already the world's largest market for smart grids by investment in 2013. In 2015, about 310 million households were using smart meters, a penetration rate of more than 80 percent, compared with 56 percent in 2013, research shows. Spending on IT solutions by health-care institutions has increased rapidly, from 15 billion renminbi ($2.3 billion) in 2011 to an estimated 34 billion renminbi ($5 billion) in 2016, annual growth of 18 percent. In education, increased spending has ensured that 87 percent of all elementary and middle schools in China have internet access today.[4] The number of monthly users of online education platforms is now 170 million in the case of children's education, 95 million for foreign language learning, and 45 million for professional education.[5]

MGI's research on digitization in the United States and Europe has found that firms in the most digitized sectors tend to be more profitable. In the United States, average profit margins in the most digitized sectors grew two to three times as much as those of less digitized sectors over the past 20 years. MGI's Industry Digitization Index for China reveals a similar overall picture. Sectors that have a high degree of digitization tend to post faster growth in labor productivity than those that are less digitized.

THREE DIGITAL FORCES CAN POTENTIALLY SHIFT (AND CREATE) 10 TO 45 PERCENT OF THE INDUSTRY REVENUE POOL ACROSS PLAYERS BY 2030

As China digitizes, industries will experience huge shifts in revenue and profit pools across the value chain, doubtless involving a degree of disruption that will create losers and winners—and disproportionate value for the latter.[6] Digital is causing creative destruction around the world, but this phenomenon is on a relatively larger scale in China due to a combination of the rapid pace of economic growth and changes in the economy, the prevalence of inefficiency across sectors, and massive potential for commercialization at scale.

We looked in detail at four sectors that offer different opportunities: consumer and retail; automotive and mobility; health care; and freight and logistics. We analyzed about 300 use cases in these four sectors, and assessed how the three major digital forces can reshape the value chain and improve productivity (see Box E1, "Three digital forces").

4 *13th Five-Year Plan for educational informationization*, Ministry of Education, June 7, 2016 (http://www.moe.gov.cn/srcsite/A16/s3342/201606/t20160622_269367.html).

5 *China online education market overview for Q1 2017*, China Internet Watch, May 16, 2017.

6 Jacques Bughin, Laura LaBerge, and Anette Mellbye, "The case for digital reinvention," *McKinsey Quarterly*, February 2017.

Box E1. Three digital forces

Disintermediation. This is a major trend in China. Alibaba and others have disrupted the retail industry by cutting out a middle layer and linking suppliers and consumers directly through digital platforms. Industries with high margins on offline channels, a lack of information transparency due to multiple layers between suppliers and customers, and a highly fragmented landscape are ripe for this type of digital disruption.

Disaggregation. Digital attackers are disrupting traditional business models and reinventing industries by disaggregating huge assets into many pieces, turning them into services, and serving fragmented consumer bases. Industries that have high value, high durability, and fluctuating utilization are the main territory for this type of disruption. Digital disruption through disaggregation is increasingly prominent in China, shared mobility being a prime example.

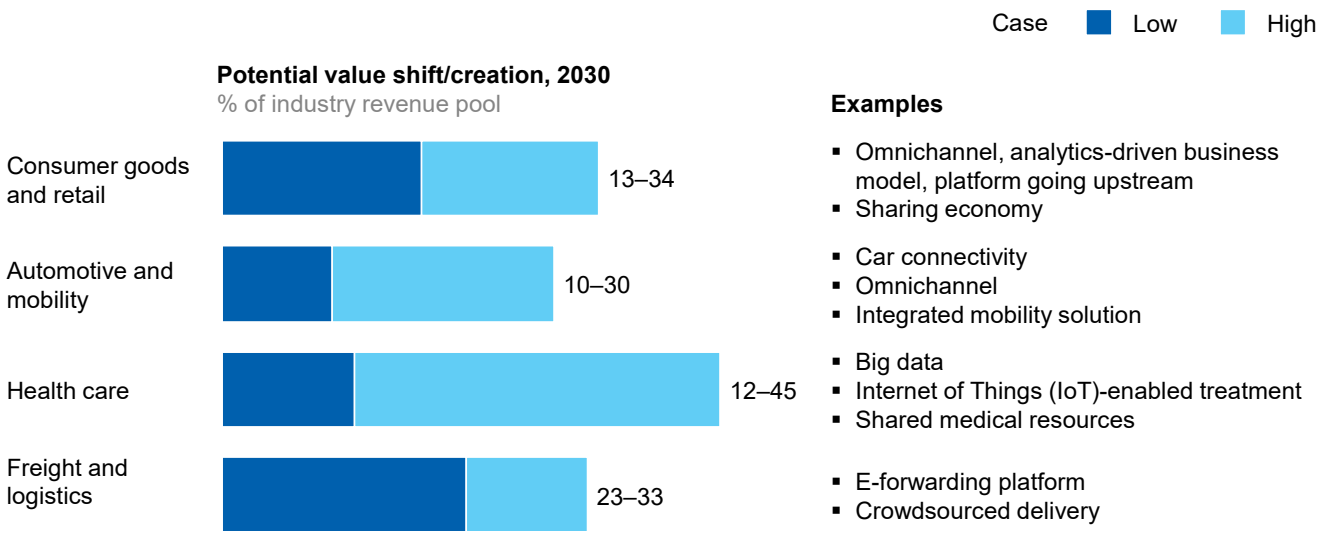
Dematerialization. This digital force changes products or processes from physical to virtual, unbundling demand with digital delivery and enabling consumers to receive products or services anywhere, anytime. In China, the pace of this conversion has been faster than elsewhere in categories such as music and e-books, and the upside for digital attackers far larger than in other countries.

Our simulation suggests that by 2030, digitization can potentially shift, and create, value equivalent to 10 to 45 percent of the industry revenue pools in the four sectors analyzed (Exhibit E3). Digital forces will shift value from old business models to new ones, from slow-moving incumbents to nimble digital attackers, and from one part of the value chain to another. For large traditional companies, this means that a substantial portion of their revenue could be at risk, lost to new products, services, and business models from digital attackers. This is especially the case if incumbents operate in vulnerable areas of the value chain and industries and companies are slow to react due to organizational inertia. Nevertheless, they can actively embrace digital, offer digital solutions, and become sources of new competition, too.

Exhibit E3

Digital forces can shift (and create) between 10 and 45 percent of the industry revenue pool across players by 2030

SIMULATION



SOURCE: McKinsey Global Institute analysis

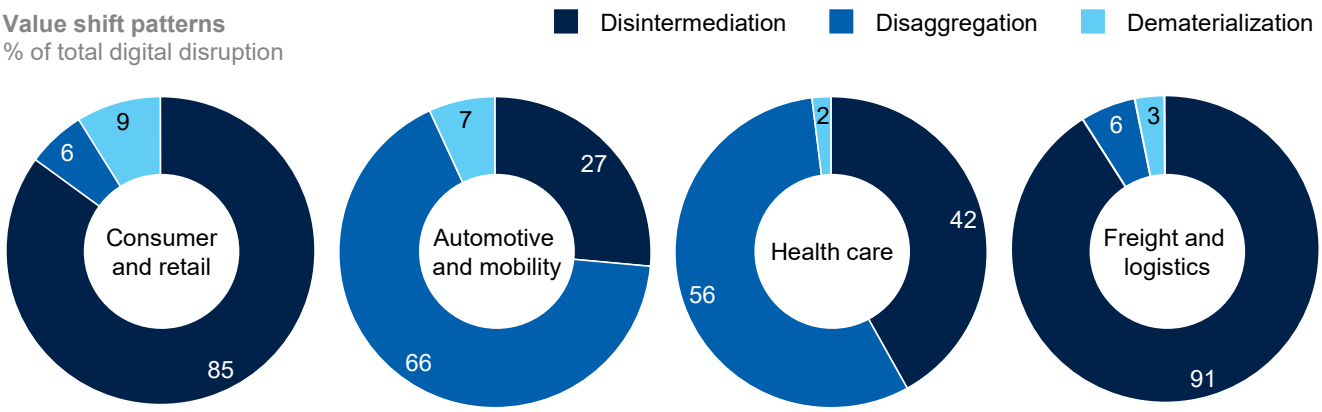
The pattern of impact of the three digital forces varies according to the sector. Overall, however, of the three digital forces restructuring value chains, disintermediation and disaggregation are the two largest in the four sectors we looked at in detail. In both cases, digital platforms play an important role by directly matching fragmented suppliers and customers, a function that can substantially improve transparency across the value chain, while offering multisided solutions that enable the rapid expansion of supply and cater to underserved demand. Dematerialization (we focused on physical dematerialization in this research, but acknowledge that such dematerialization also leads to virtualization of services) has the smallest overall impact in our simulation (Exhibit E4).

Exhibit E4

Disintermediation and disaggregation are the major forces in value-chain restructuring

HIGH SCENARIO

Value shift patterns
% of total digital disruption



SOURCE: McKinsey Global Institute analysis

Consumer and retail: Digital is reshaping the retail experience for customers

Digitization in China thus far has largely been driven by the e-commerce revolution, but we expect an even more significant transformation to unfold in the years ahead. Our simulation finds that digitization can shift—and create new value—on the order of 13 to 34 percent of the industry revenue pool. The major force in play in shifting and creating value is disintermediation. In addition to continued growth of e-commerce as online sales penetrate further into rural areas, into smaller cities, and across borders, three additional trends are unfolding and transforming this sector.

The first trend is the continued evolution of an integrated omnichannel experience for consumers that mixes offline and online. According to the 2017 McKinsey China iConsumer Survey, an overwhelming majority of shoppers in China—85 percent—are already omnichannel consumers. Broadly, offline is shifting from being a primary sales channel to a shopping "experience." In the consumer-electronics category, shoppers who performed online research while visiting a retail outlet bought the same brand they originally had in mind more than 80 percent of the time. Therefore, brands and retail companies need to pay close attention to shaping the omnichannel experience. It offers huge room to experiment and improve. About 60 to 70 percent of shoppers surveyed said that they were excited about omnichannel services such as online-to-offline (O2O) product pickup, QR code-scan payments, product-return services, and VR experiences at offline stores. Nevertheless, only 10 to 25 percent of shoppers surveyed said that they had actually used these offerings. Consumer goods and retail companies need to take this into account if they are to retain their existing customers and maximize unexplored selling potential. As the traditional e-commerce business model becomes commoditized, digital attackers also have an incentive to experiment with new retail models.

The second trend is toward data-driven business models that can more effectively serve Chinese consumers who increasingly want to buy higher quality and customized products and services. With technology as an enabler, digital media, social networking, and search engines give content away. Therefore, consumer-goods and retail companies can monetize much more consumer data, understand customers' behavior and sentiment in real time, and influence consumer decisions more than ever before. Analytics and digital connections with consumers are enabling the emergence of new customer-to-business solutions that engage customers directly and gather their data so that orders can be customized. Chinese companies are increasingly adopting the model: one yogurt company takes into account recommendations from its customers when developing a new flavor or packaging, an apparel company has a customized manufacturing solution, and a furniture company has a tailored design solution.

The third trend that may unfold in China (as it is elsewhere) is that digital platforms go upstream as they accumulate know-how and own their consumer relationships. Observers have long been skeptical about online platforms moving beyond their core businesses, but it is happening. In the United States, for instance, Netflix is now producing its own content, and Amazon has launched private labels since 2004. In both cases, the platforms acted in an attempt to broaden their business and strengthen their relationships with consumers.

The impact of disaggregation (the sharing of goods and services, and the rental of second-hand or used goods) and dematerialization is relatively small in consumer and retail at a combined 2 to 5 percent of revenue. These forces are likely to occur as companies meet demand in specific categories and niche markets.

60%
of Chinese survey respondents say owning a car is no longer a status symbol

Automotive and mobility: Digital is transforming the future of transportation

The digitization of cars is gathering pace, and digital solutions will reshape the mobility of China, which is the world's largest automotive market but faces a range of economic and social issues, including urban traffic congestion and air pollution. Our simulation finds that digitization can shift and create value equivalent to between 10 and 30 percent of the automotive industry revenue pool.

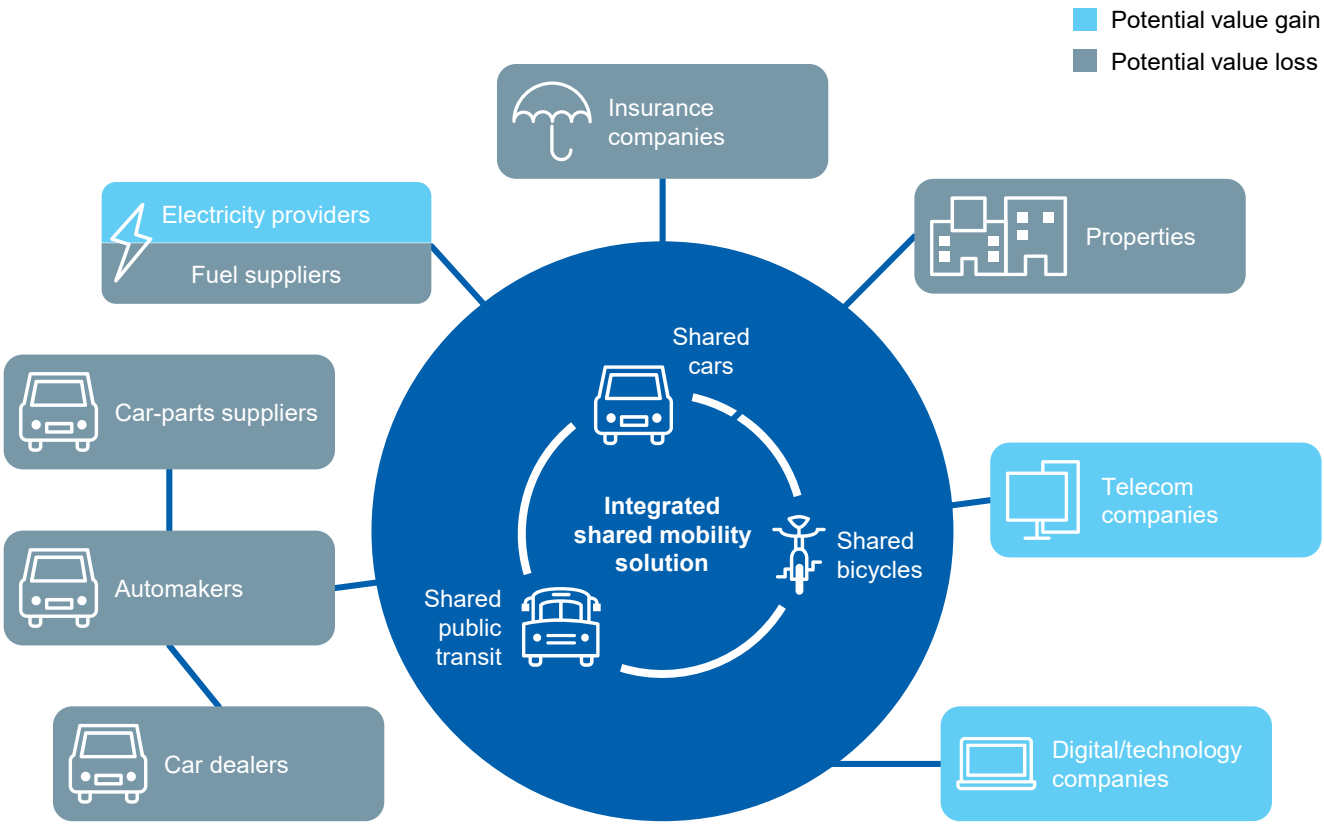
Disaggregation, notably through shared mobility, can facilitate an ongoing shift from an ownership model to a service-driven one. The dominant shared-mobility model today is ride sharing, but there is a move toward integrated solutions that link passenger cars, public transit, and last-mile solutions such as bicycles that will transform the way people move. According to the 2016 McKinsey China Auto Consumer Survey, 60 percent of respondents said that owning a car was no longer a status symbol, and 42 percent said that owning a car was less appealing today because of high maintenance costs and worsening traffic congestion.[7] This can create ripple effects on original equipment manufacturers (OEMS), dealers, suppliers, and providers of digital mobility solutions, as well as governments, insurance companies, energy providers, and suppliers of technology (Exhibit E5).

Disintermediation enables OEMs and component and technology suppliers to establish direct relationships with consumers, influencing their decisions. Using omnichannel approaches, OEMs can serve consumers directly, in the process obtaining valuable firsthand insights into their purchasing preferences. In an extreme case, the entire consumer decision journey—searching for a vehicle, test-driving it, paying for it, and obtaining after-sales service—could be digitized.

[7] The China Auto Consumer Survey interviewed more than 3,500 consumers in order to measure changing consumer behavior and attitudes toward cars. See *Finding the fast lane: Emerging trends in China's auto market*, McKinsey & Company, April 2016.

Exhibit E5

Integrated mobility solutions can fundamentally change how people move and create ripple effects in adjacent industries



Consumer attitudes toward car ownership are changing

60% In contrast to before, owning a car is no longer a status symbol

40% I can live without a car and I can rent when I need a car

Shared mobility solutions are penetrating rapidly

30% E-hailing or car-sharing penetration

67% 17-minute decrease in commuting time

SOURCE: McKinsey China Auto Consumer Survey 2016; China Shared Economy Survey 2017; McKinsey Global Institute analysis

Car connectivity can enable component suppliers or providers of technology solutions to bypass OEMs and establish direct relationships with customers through offerings such as in-car entertainment, operating systems, and other value-added services; again, having a direct line to customers means that these companies can influence their decisions. Survey evidence suggests that Chinese consumers are not only eager to adopt all that connected cars have to offer but are also willing to pay for those features. In the 2016 McKinsey Car Data Monetization Survey, 68 percent of Chinese respondents said that connected entertainment features were relevant and that they were willing to try them, compared with 34 percent in the United States and 21 percent in Germany.

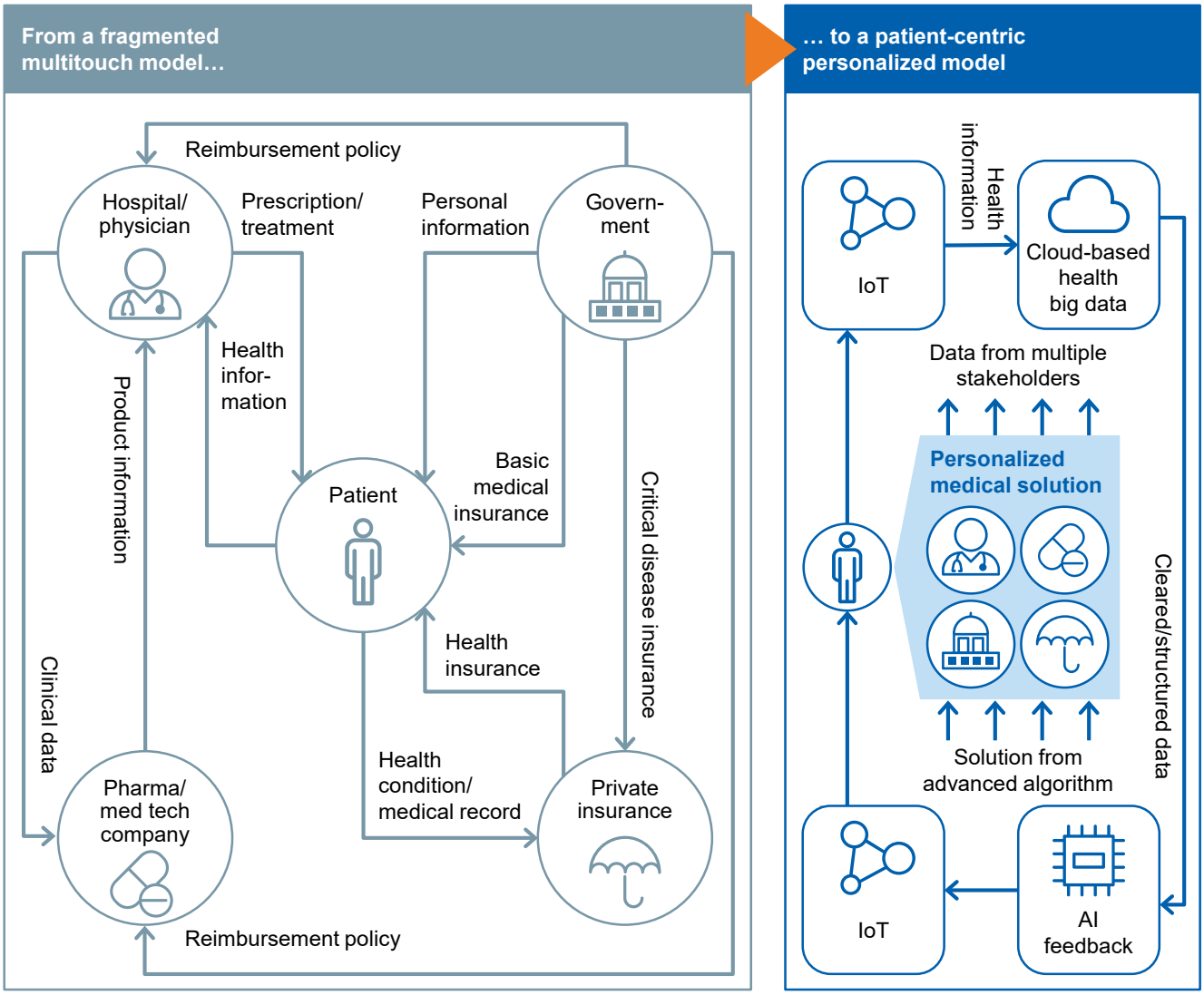
Health care: Digital solutions can be used to build a patient-centric system

China has substantially improved its health-care services, especially since the reforms of 2009. Health-care spending has been growing five to ten percentage points faster than GDP over the past decade, and today the health-care system covers 95 percent of the population. However, the system still faces a range of challenges, and digital technologies can help to address them. Our analysis finds that digitization can shift and create new value

on the order of 12 to 45 percent of health-care spending. If a big-bang scenario were to happen, combining significant developments such as health-care big data, AI-empowered treatment, and Internet of Things (IoT)–enabled services, the impact could be the largest of the four sectors we analyzed and, in the process, usher in a more efficient system in which the patient is at the very center (Exhibit E6).

Exhibit E6

In a big-bang scenario, the patient becomes the center of digital health care



SOURCE: McKinsey Global Institute analysis

Disintermediation includes IoT and remote monitoring, AI-enabled care, and e-commerce. IoT solutions can help address China's chronic and non-communicable diseases. China is home to an estimated 260 million patients with chronic diseases, and this number is likely to continue to increase. Chronic disease is estimated to cause 85 percent of all deaths in China.[8] Wearables, mobile health-care apps, and telemedicine solutions can help users be more aware of health issues at an earlier stage to help them prevent illnesses from emerging or deteriorating. AI-enabled digital solutions are another way for health-

[8] See *Nutrition and chronic conditions of Chinese residents report*, National Health and Family Planning Commission, June 30, 2015; Angela Wang, "Chronic diseases cause 85 percent of deaths in China, says report," *The Epoch Times*, July 10, 2012; and *Global status report on noncommunicable diseases 2014*, World Health Organization, 2014.

care providers to provide more consistent and timely diagnosis and treat patients more directly and accurately. Some evidence shows that diagnosis is sometimes inadequate in China, overtreatment occurs, and that there is huge variation in the quality of health-care provision among different regions and types of hospital and clinic.[9] One study found that village doctors asked their patients only 18 percent of essential questions, correctly diagnosed just 26 percent of unstable angina cases, and dispensed medication that was either unnecessary or harmful in 64 percent of cases.[10] Finally, there is huge potential for e-commerce and business-to-business (B2B) sales of drugs in China given how many layers of transactions there are. The country recently introduced a "two-invoice system" that will reduce the number of steps it takes for hospitals to procure drugs from manufacturers, currently five to eight, to no more than two, helping to reduce highly inflated drug prices by a considerable margin.

Disaggregation in health care centers on efforts to consolidate fragmented data and medical resources, and then monetize them by disaggregating them into services that offer improved diagnosis and treatment, improved access to patients, and higher utilization rates of facilities. Medical data in China are currently segregated in data "islands" within each hospital or health-care institution. The degree of digitization is low. As of 2015, about 29 percent of hospitals in China had not installed electronic medical records systems, compared with only 4 percent in the United States in 2014, for example.[11] Health-care big data could generate substantial value for different players in the sector. Medical-technology and pharmaceutical companies could improve the productivity of their R&D and offer personalized medicine for patients. Health insurance companies can substantially reduce waste from fraud and overtreatment due to information asymmetry. With big-data analytics, they can cross-check claims data with clinical data and analyze billing patterns, and therefore help to identify inappropriate payments. With better understanding of patients, companies can encourage behavioral changes that could cut the cost of insuring them. Zhong An Insurance, the first online-only insurer in China—which is a joint venture of Alibaba, Tencent, and Ping An—is exploring the use of big data in its product development and claims management. Using a connected glucose meter, the company has designed a system of rewards and penalties for those people it insures that improves their compliance with treatment and therefore the outcome of that treatment.[12]

Freight and logistics: Players can reach customers faster and cheaper through digital

China's traditional freight and logistics sector faces significant challenges. The cost of logistics as a percentage of GDP is around double the figure in the United States. Higher costs in China reflect the industry's inefficiencies caused by fragmentation of the sector, operational shortcomings, and relatively limited competition in certain segments. Our simulation finds that digitization can shift and create value equivalent to between 23 and 33 percent of the industry's revenue pool.

Disintermediation (or digital intermediation) can boost efficiency, particularly in highly fragmented industries. In China's road-transportation industry, about 95 percent of the approximately eight million registered trucking companies or individual truckers are small and medium-sized concerns.[13] Managing freight transit with such a large number of self-

9 *Healthy China: Deepening health reform in China: Building high-quality and value-based service delivery*, policy summary, China Joint Study Partnership, 2016.

10 Sean Sylvia et al., "Survey using incognito standardized patients shows poor quality care in China's rural clinics," *Health Policy and Planning*, volume 30, number 3, March 20, 2014.

11 Electronic medical records are a digital version of traditional paper-based medical records for an individual, such as medical history, diagnoses, medications, and allergies.

12 *Product update of Doctor Tang*, Huanqiu, September 14, 2016 (http://tech.huanqiu.com/internet/2016-09/9441274.html).

13 *Transportation statistics bulletin of the China Road Transport Association*, CRTA, May 12, 2016 (http://www.crta.org.cn/article-2349.html).

employed or small enterprises adds operational complexities. Another challenge is the fact that participants in this sector lack transparent, real-time information on routing, which leads to many trips by empty trucks. In China, the average empty running ratio in road transportation is about 40 percent, far higher than 10 to 15 percent in the United States and Germany. Online platforms that connect business users with truck companies or individuals have enormous power to disintermediate small traditional trucking companies. Ymm56 offers real-time matching in trucking services and integrates receipts, loans, and other financial services into its offering; the company has 850,000 registered shippers and three million heavy truck drivers on its platform.

31B
packages by express delivery in 2016, from
0.3B
a decade earlier

Disaggregation can address challenges in express delivery. The annual volume of express delivery in China soared to 31 billion packages in 2016, from 0.3 billion only a decade earlier. In addition, consumers expect goods to be delivered more quickly. As demand fluctuates significantly between peak and off-peak times, and labor costs rise rapidly in China, it is even more important for express-delivery companies or e-commerce delivery units to be efficient and flexible in their deployment of delivery drivers. There are now platforms that crowdsource delivery drivers, including Dada (later merged with JD Daojia), Shensong, and Fengniao Delivery.

Dematerialization driven by 3-D printing, e-working, and paperless solutions can reduce the flow of goods, but its impact is likely to be relatively small compared with the other two forces.

BUSINESSES CAN IMPROVE PRODUCTIVITY BY DIGITIZING THEIR OPERATIONS

In addition to restructuring value chains, adoption of digital technologies by businesses can boost sector productivity and generate impact equivalent to between 3 and 14 percent of the industry revenue pool. Some digital tools boost top-line growth, and others reduce cost. There is a significant opportunity for Chinese companies both to catch up with best practices and to use the strengths of China's digital ecosystem.

In consumer and retail, we estimate that the adoption of digital solutions (including big data analytics, smart customer relationship management, and IoT) can improve productivity by 3 to 10 percent of the size of the industry revenue pool. In automotive, digital in manufacturing (customized R&D, the digitization of supply chains, and smart manufacturing), marketing and services (precision marketing and smart pricing), and the back office (digitization of human resources and IT functions) could boost productivity by between 5 and 14 percent of the size of the industry revenue pool. In health care, digital levers (such as clinical decision support systems, information sharing, ratings and review platforms, online health communities, the use of radio-frequency identification technology in the pharmaceutical industry, and online digital learning platforms) can help companies in China save costs equivalent to between 3.0 and 5.5 percent of health-care expenditure. In freight and logistics, digital solutions (for example, yield management and dynamic pricing, real-time track and trace, optimized routing using advanced analysis, and autonomous trucking) could boost the productivity of the sector by the equivalent of 4 to 9 percent of the industry revenue pool.

Applying digital levers will boost companies' competitiveness. We note, however, that not all savings will go to the bottom line—as market competition intensifies, at least some of those savings will need to go to consumers.

China's labor supply expected to fall from

773M

to

757M

by 2030

POLICY MAKERS CAN CONTINUE TO FACILITATE THE DIGITAL ECONOMY IN A NUMBER OF WAYS

Local and national governments in China have already done a significant amount to encourage the expansion of the digital ecosystem. They can continue to act in four areas.

- **Continue to be an important investor in, and consumer of, digital technologies and infrastructure.** The government can create a market for frontier technologies such as robotics and AI, encouraging long-term investment and innovation by companies, and continue to invest in expanding the infrastructure needed to address the divide between China's digital haves and have-nots. Digitizing government operations could make a substantial contribution to China's consumption of digital technologies.[14]

- **Promote dynamic and healthy competition to fuel innovation and serve the interests of consumers.** Although market concentration enables these digital giants to invest at scale in cutting-edge technologies such as AI and autonomous driving, there are concerns about whether the emerging phenomenon of digital monopolies offers a good deal to consumers. Legal debates about antimonopoly measures have arisen in China in relation to security software and shared mobility, for example. It is therefore important to ensure that the government acts to counter any abuse of market power, and to ensure dynamic and healthy competition through legislation and ensuring that entry barriers are low so that new players can compete with incumbents. Opening up government data can be another initiative to set a level playing field.

- **Manage labor markets during digital disruption.** Job churn will inevitably increase as new digitized sectors undermine traditional ones. In our base-case simulation, we found that 176 million to 253 million jobs can be created due to macroeconomic factors, and 161 million to 281 million jobs can be destroyed due to digital forces and automation.[15] Given that China's labor supply might decline from 773 million today to 757 million by 2030, the digital shock to the labor market appears manageable—as long as an effective program is in place, and government, companies, and individuals all contribute to making the transition as smooth as possible. Government can support lifelong learning and can reform education to help people equip themselves with the right skills while improving job-deployment programs and increasing labor mobility to ease friction during the transition.

- **Contribute to global debates on digital governance to reach consensus.** As digital technologies sweep through the global economy, there is intense debate about how to react to and govern the digital world. It benefits all governments to collaborate on issues such as cybersecurity, digital standards, intellectual property rights, and digital sovereignty. China is already involved in many discussions on such issues, and it should continue to play its full part to reach global consensus.

[14] China ranked 63rd of 193 countries on the United Nations' e-government index in 2016. It was seven places higher than in 2014 but still far below regional neighbors South Korea (third) and Singapore (fourth). See *United Nations e-government survey 2016: E-government in support of sustainable development*, Department of Economic and Social Affairs, United Nations, 2016.

[15] Our simulation of job creation is based on seven macroeconomic factors including rising income and demographic changes. Our simulation of job destruction is based on the three digital forces and automation. The simulation does not estimate total job turnover in the economy.

China's labor productivity only

15–30%

of OECD average

BEST PRACTICES SUGGEST SIX PRIORITIES FOR BUSINESSES AS CHINA DIGITIZES

Given the scale of China and the pace of transformation into a digital economy, companies that are slow to respond face a great risk of being left behind. Conversely, widespread inefficiencies in China's sectors and huge opportunities for commercialization mean those that act boldly can reap considerable rewards. McKinsey's experience working with companies around the world suggests that six approaches would be effective in China.

- **Adopt bold strategies.** Previous MGI research has found that bold, large-scale responses to digital disruption pay off three times as much as less aggressive reactions.[16] Widespread inefficiencies in China's sectors (where labor productivity is only 15 to 30 percent of the Organisation for Economic Co-operation and Development [OECD] average) suggest very large upside potential for disrupters. Companies can assess their vulnerability to the three digital forces and determine whether they want to play offense or be "fast followers"—moving when circumstances warrant doing so. Companies need to be prepared to disrupt their own business models in order to compete with attackers and actively develop new customers in new business areas. They should seek to be the default choice for customers in order to avoid being disintermediated by platforms or algorithms.

- **Use the power of China's vast digital ecosystem.** The influence of digital giants is bigger in China than in other economies because they not only have massive user bases, but also are active investors and providers of cross-sector digital solutions. Companies can be in a stronger position if they are part of an ecosystem, if necessary by creating their own. Companies should consider how best to collaborate with large digital platforms. The number of collaborations is growing. Examples include a cosmetics company that has shortened time to market by using Alibaba transaction data, an automotive company delivering targeted ads through WeChat, and a bank using Baidu map data for its branch expansion. Companies can also look at creating their own digital ecosystems in areas where large incumbents can still have natural advantages such as industry networks and expertise, especially in B2B areas.

- **Maximize value from analytics by using China's massive data pools.** Gathering and using data is increasingly a core competitive advantage for companies. China is superbly positioned because of the huge scale of data gathered every day. There are also arguably more opportunities to monetize data given that Chinese consumers are more willing to share their data than many of their international counterparts. To make the best use of data and analytics, companies can start by establishing the business imperative for gathering and analyzing data, deploying clear use cases to ensure that the CEO and top executives (and not just the IT department) support the effort. They need also to break down silos so that data can be shared across the organization, and actively look at ways to monetize them.

- **Build an agile organization for digital transformation.** Digital disruption is accelerating, and businesses need to be agile to respond rapidly. Chinese companies tend to be hierarchical, which arguably makes them inflexible. One way to address this is to reorganize in smaller teams. ING, for instance, put together 350 nine-person squads, and Haier restructured itself into microenterprises. Digital transformation needs the support of the CEO and top executives, a chief digital officer to lead the effort, and development of the right skills.

[16] In a McKinsey survey of C-suite executives around the world that captured responses from 2,000 traditional firms in more than 60 countries, 90 percent of companies said they were engaged in some form of digitization, but only 16 percent of them had responded boldly and at scale. See Jacques Bughin and Nicolas van Zeebroeck, "The best response to digital disruption," *MIT Sloan Management Review*, summer 2017, April 6, 2017.

- **Digitize operations based on a solid transformation program.** The scope for transformative digitization programs in Chinese companies is extremely large given the fact that the economy is still growing robustly, digital technologies are transforming the economy so quickly, and so many businesses are unprepared. The largest impact can be achieved through a comprehensive and structured transformation program.

- **Engage with China's policy and regulation.** The government has made it clear that digitization of the economy is a major priority. It is in companies' interest to keep abreast of policy and regulatory developments, understand how they may affect business, and determine what business opportunities may be available from working with government, as many companies involved in smart-city projects are already doing. More than 300 Chinese cities have signed construction contracts with IT companies.

•••

China is already a considerable global force in digital, and there is huge further scope to use digital technologies to transform the economy at home and influence the global digital landscape. China's internet giants have established strong positions in their respective markets and China's digital ecosystem is broadening; leading traditional companies are driving their digital transformations, building their own ecosystems, and going global; China's strong manufacturing base is spurring innovation in hardware and connectivity. Sectors that today are fragmented and inefficient can become streamlined and highly productive if the full power of digital is unleashed. The scope for very large value shifts and creation is substantial. A combination of wide-ranging inefficiencies across sectors, enthusiasm among Chinese consumers to embrace digital tools, and massive potential for commercialization points to further digitization in China on a truly enormous scale that can have a major impact on the global digital landscape. China's digital globalization is just getting started.

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